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Weinmeister et al.

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(54) **PORTABLE FAN**

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(51) **Int. Cl.**

F04D 29/52	(2006.01)
F04D 25/06	(2006.01)
F04D 29/00	(2006.01)
A62C 3/02	(2006.01)
F04D 25/08	(2006.01)

(52) **U.S. Cl.**

CPC ***F04D 29/522*** (2013.01); ***F04D 25/0673*** (2013.01); ***F04D 29/002*** (2013.01); *A62C 3/0207* (2013.01); *F04D 25/08* (2013.01)

(58) **Field of Classification Search**

CPC F03D 25/0673; F03D 25/08; F04D 29/403; F04D 29/522; F04D 29/601; F04D 19/002; A62C 3/0207

See application file for complete search history.

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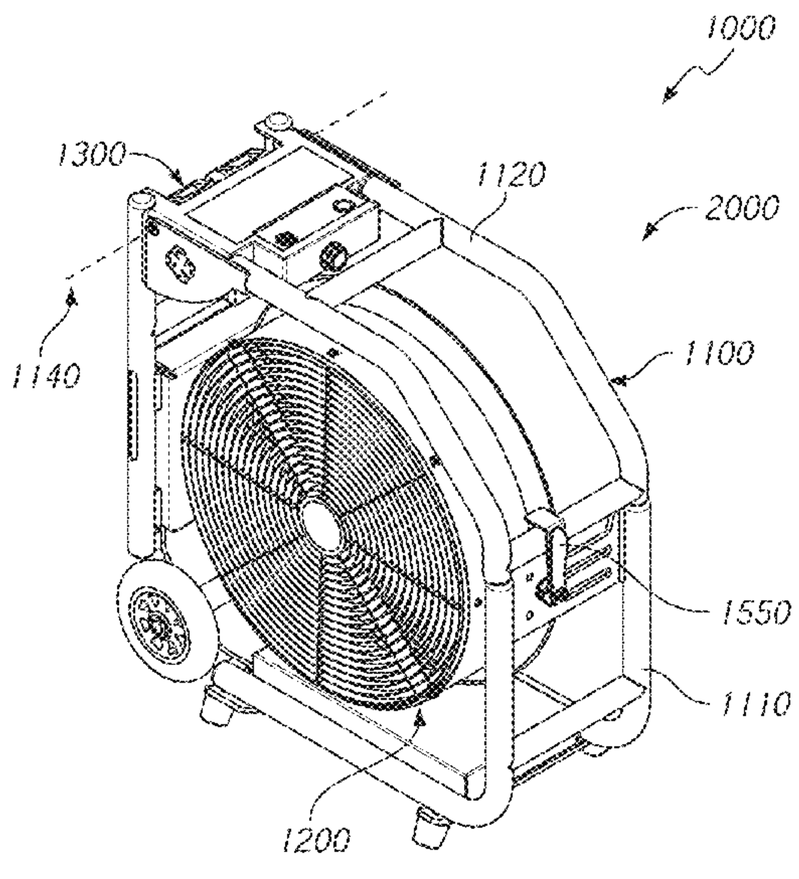
(57) **ABSTRACT**

The present invention is directed to a portable fan for the use in firefighting and other ventilation use-cases. The portable fan provides firefighters the ability to provide positive pressure ventilation in use for fighting fires which does not require power cables or combustible fuel powered motors, and provides increased portability, reduced risk, and reduced deployment time associated with managing and fighting a fire.

17 Claims, 12 Drawing Sheets



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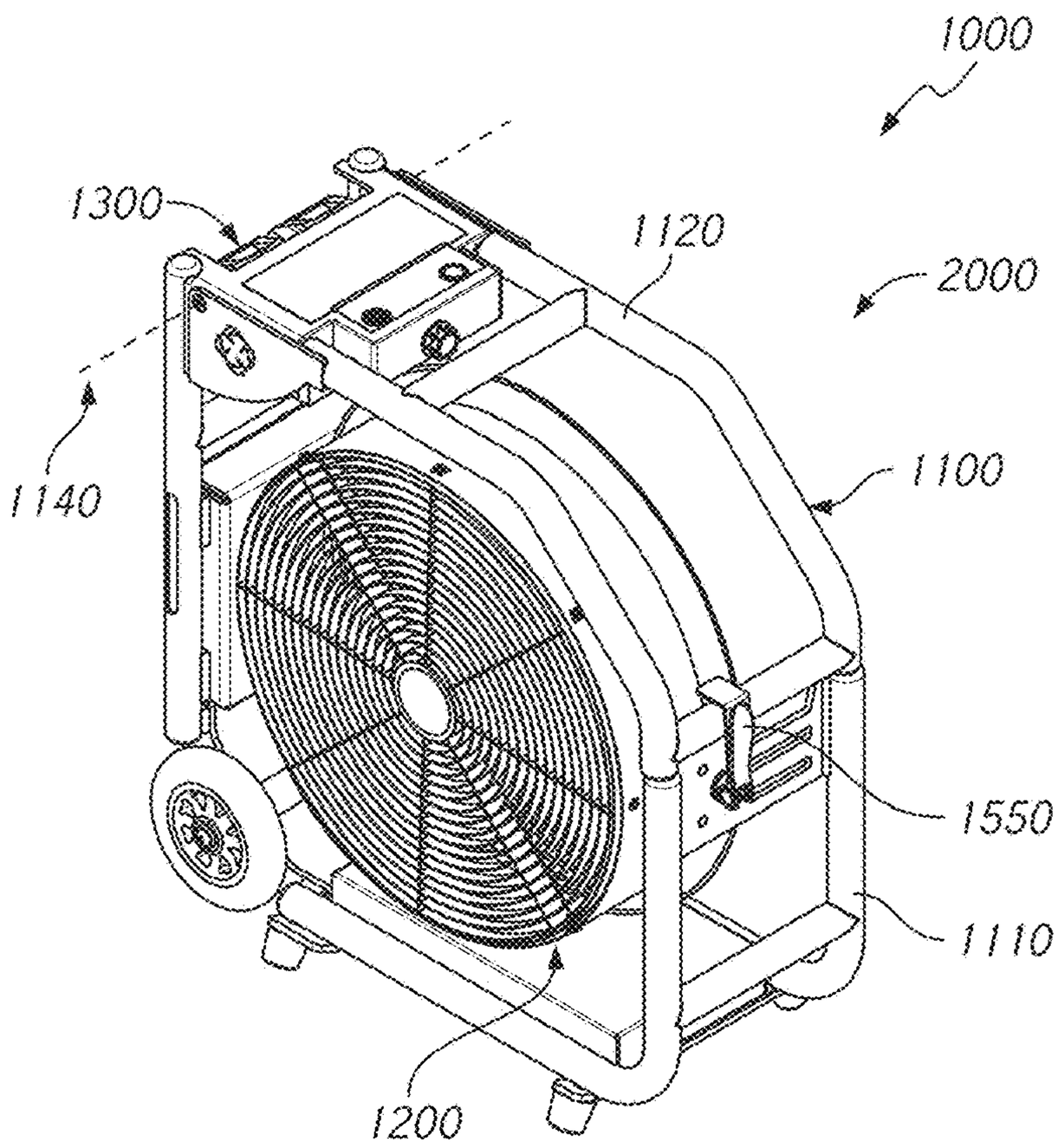


FIG. 1A

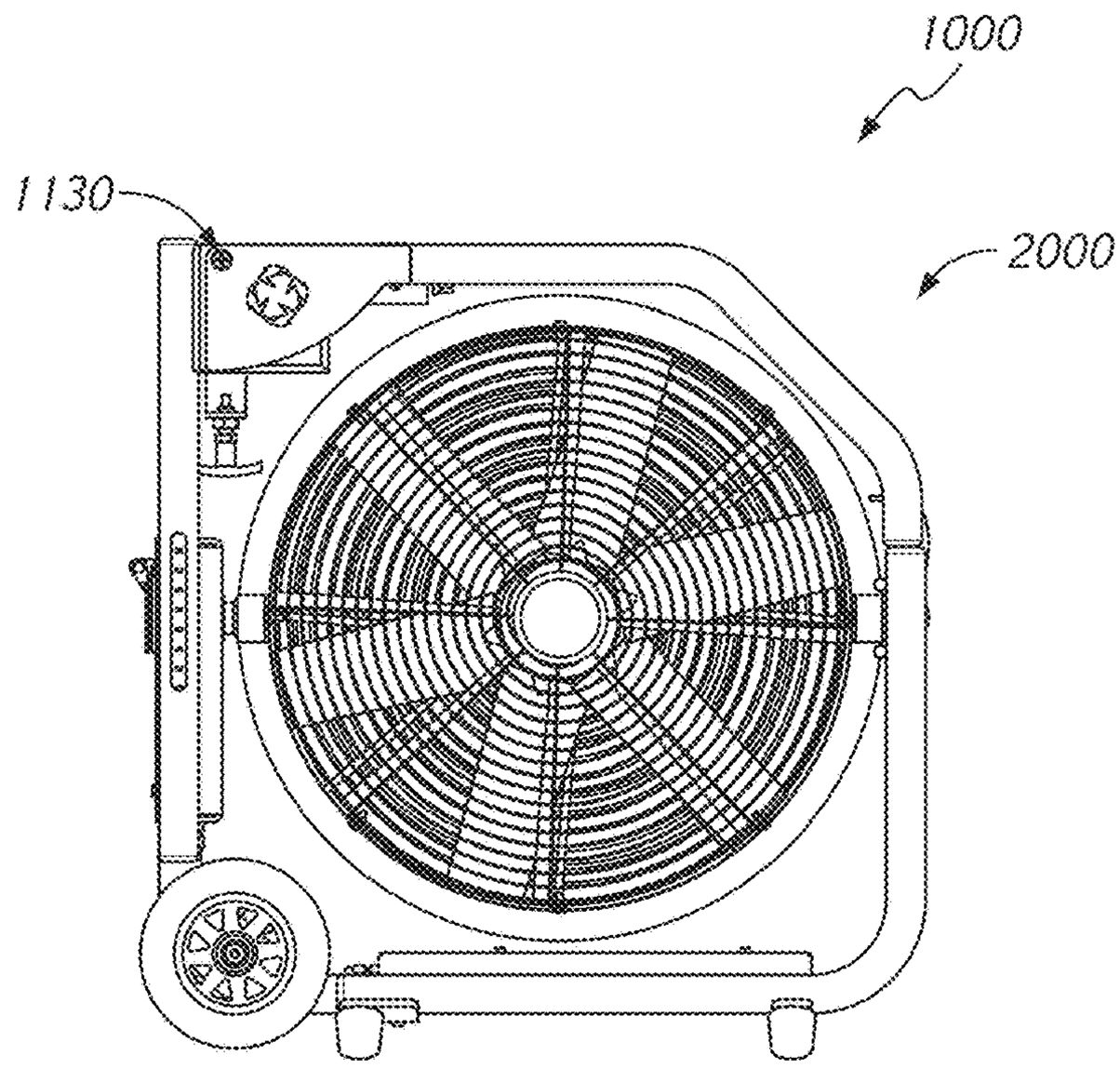


FIG. 1B

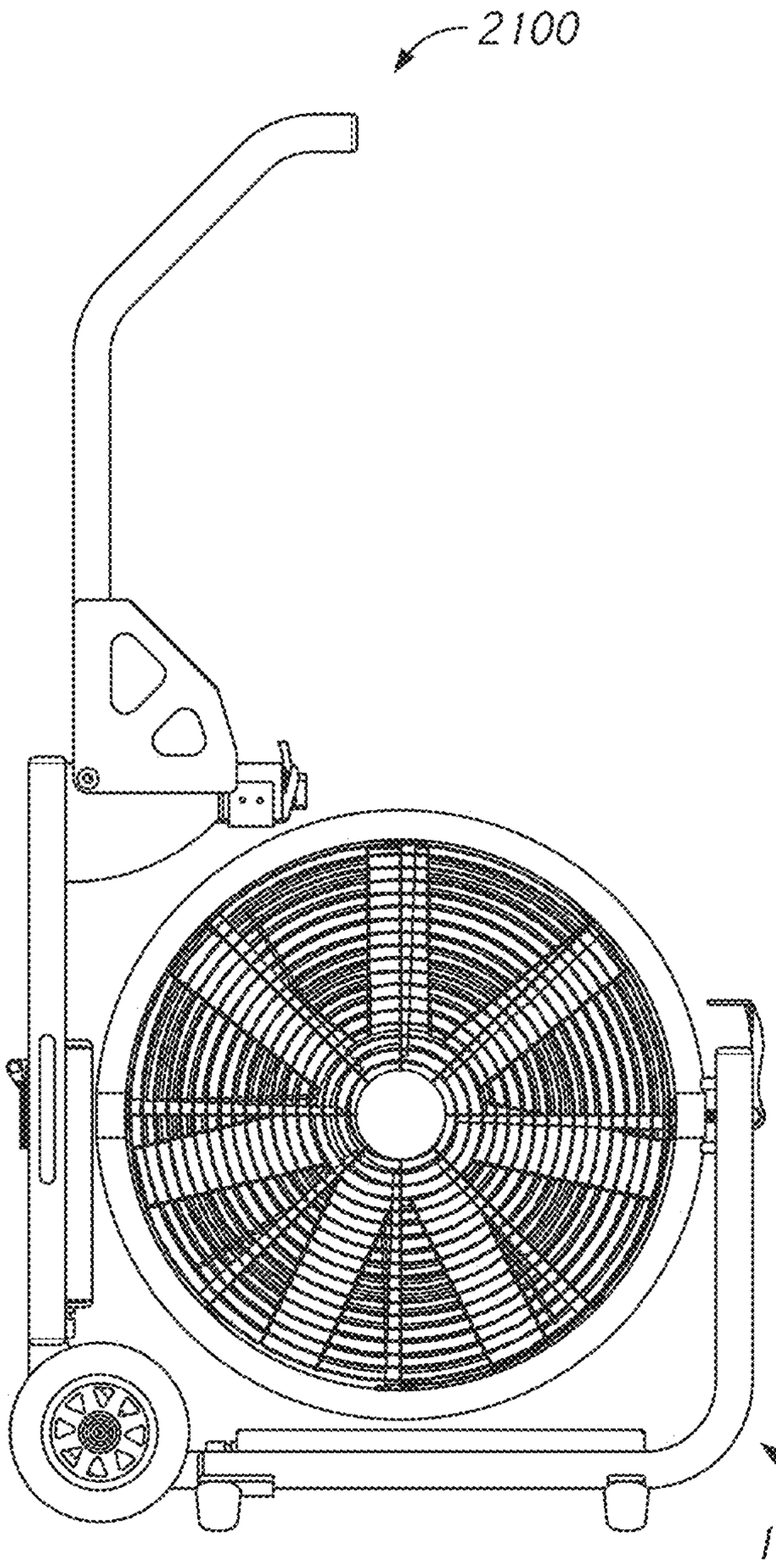


FIG. 2A

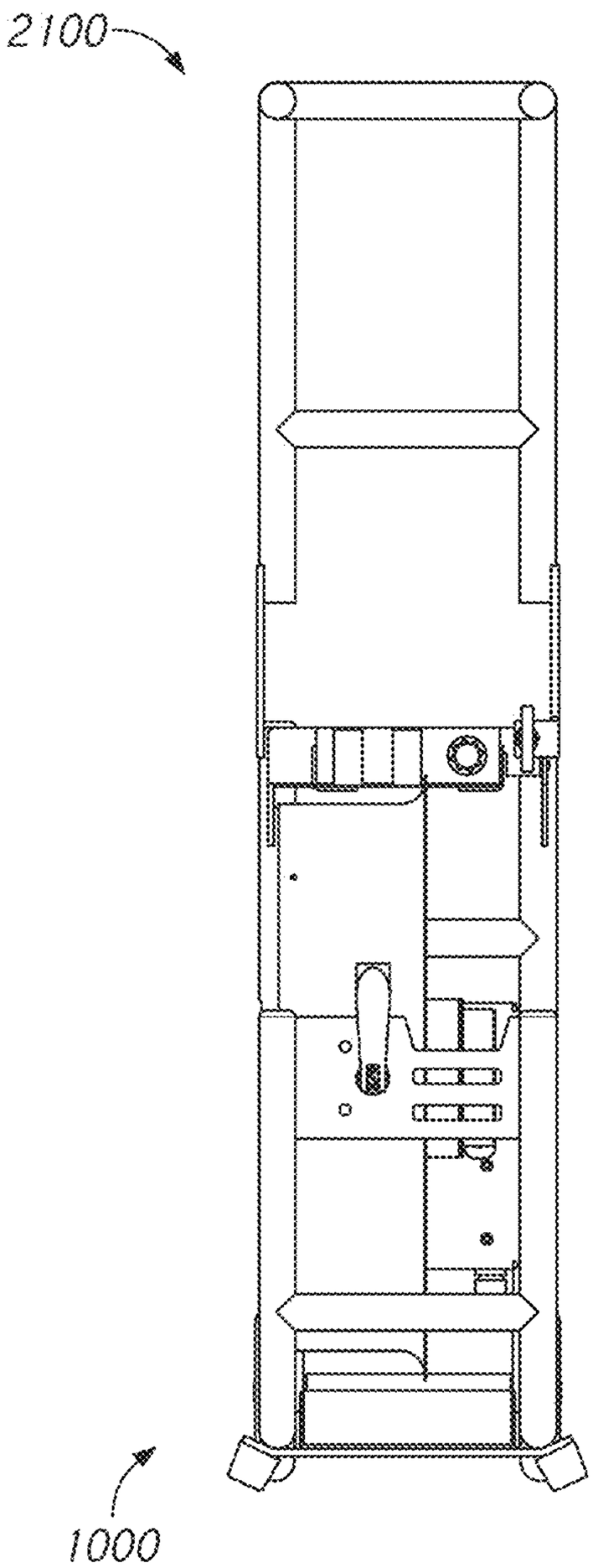


FIG. 2B

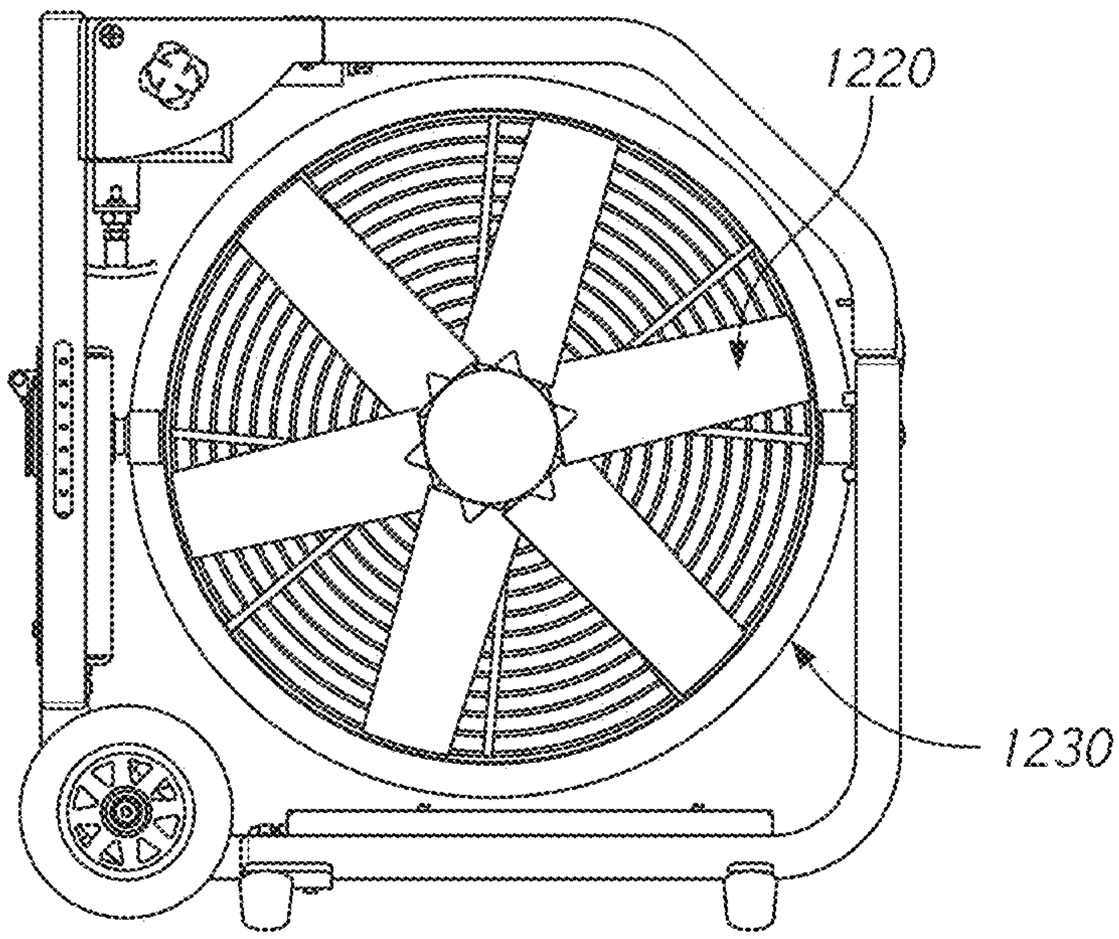


FIG. 3A

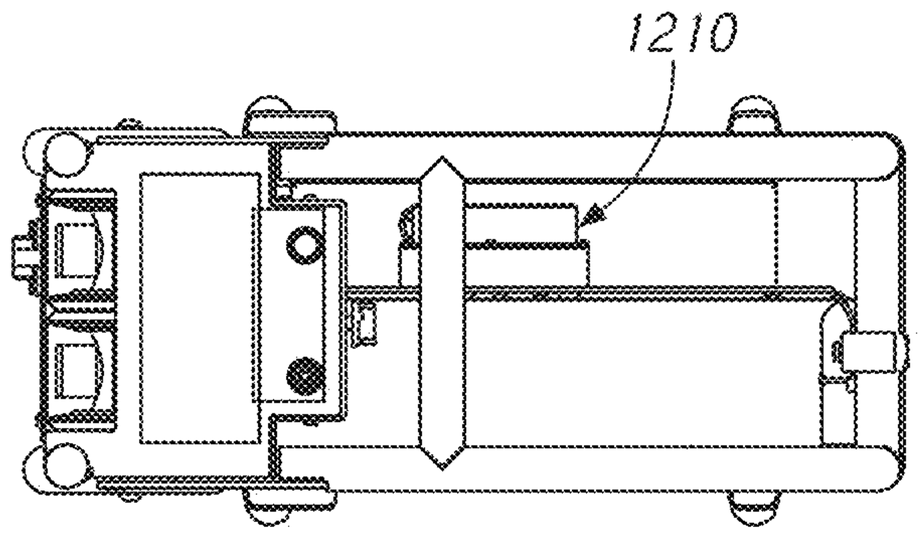


FIG. 3B

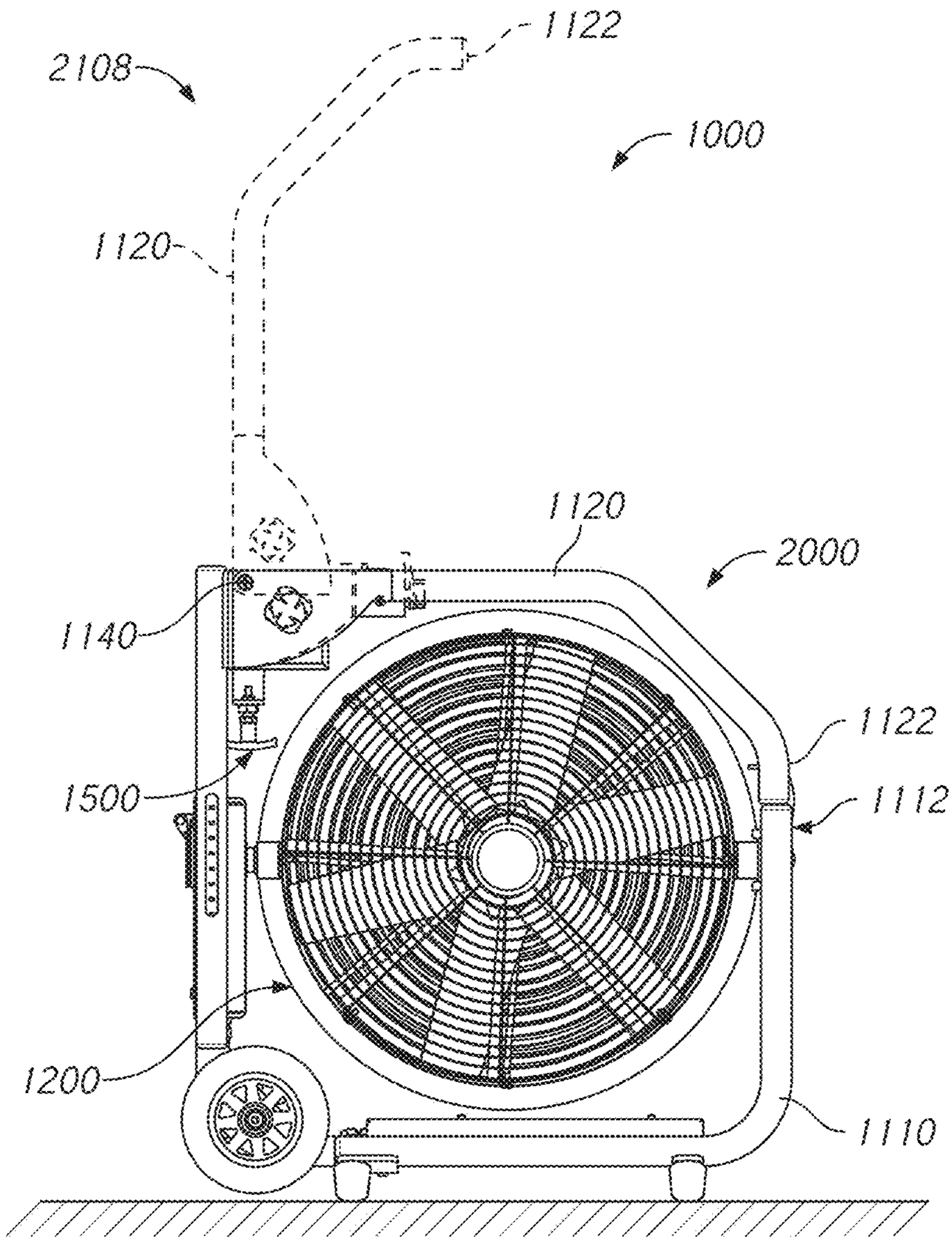


FIG. 4A

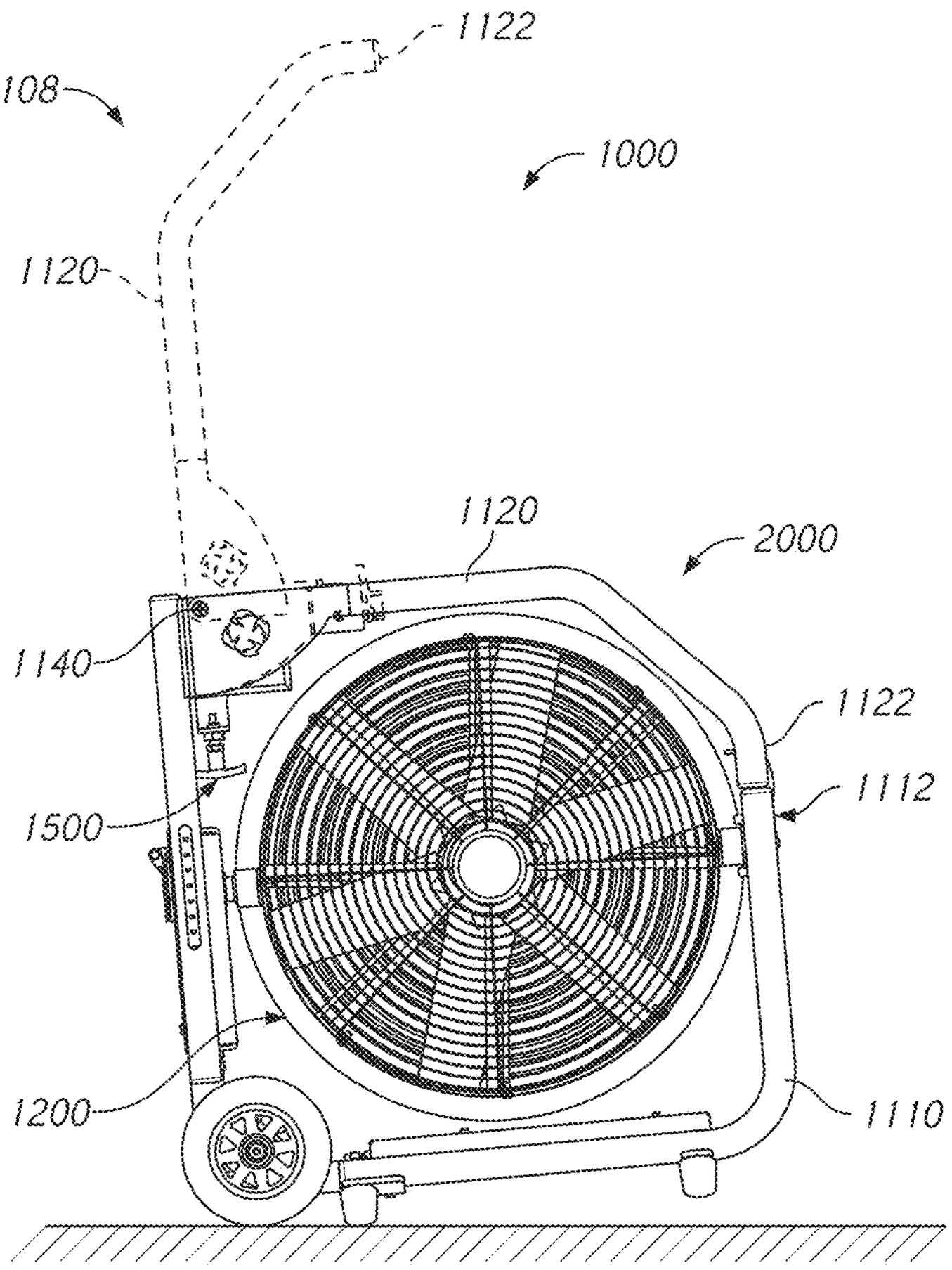


FIG. 4B

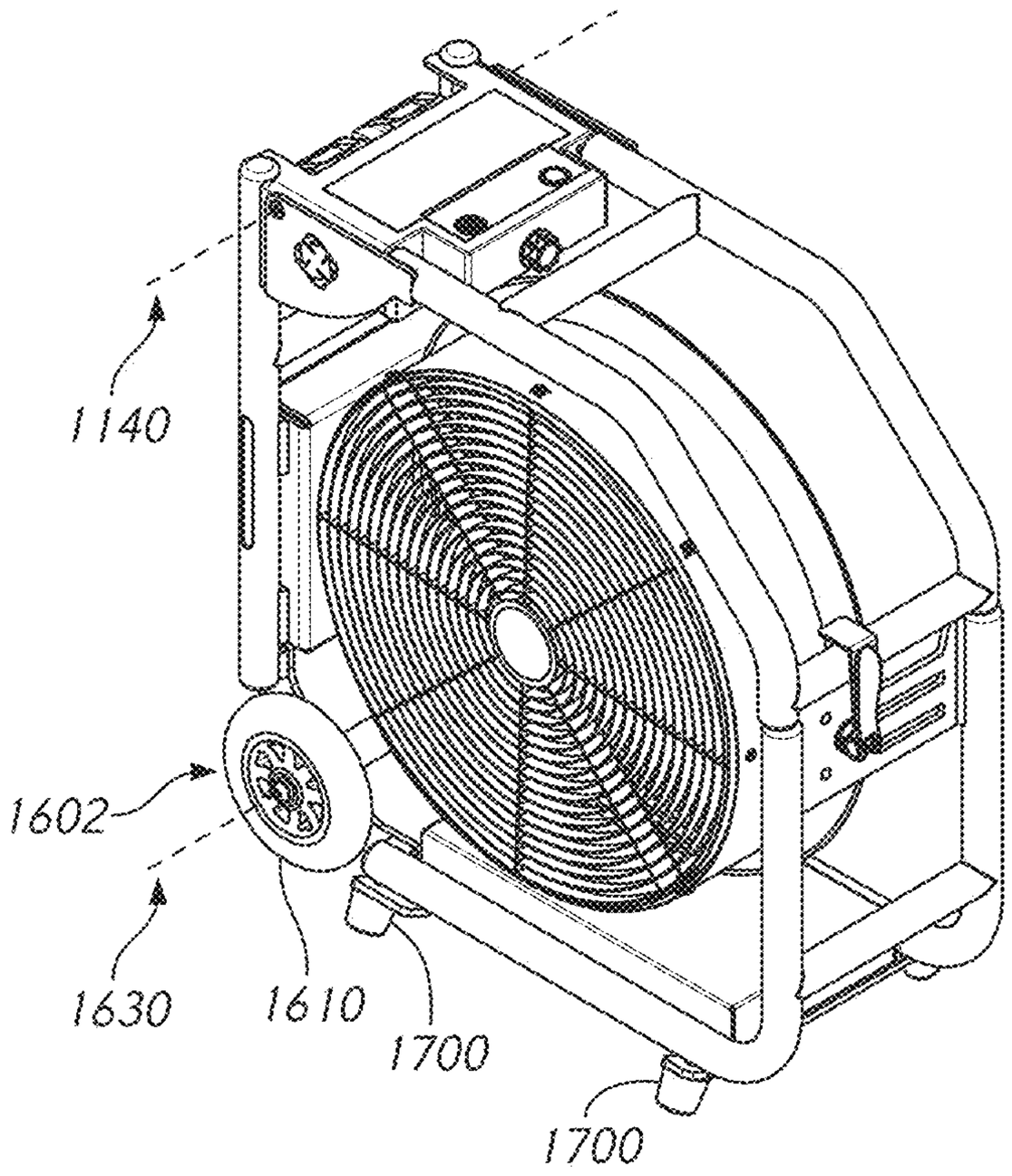

1140
1602
1630
1610
1700
1700

FIG. 5A

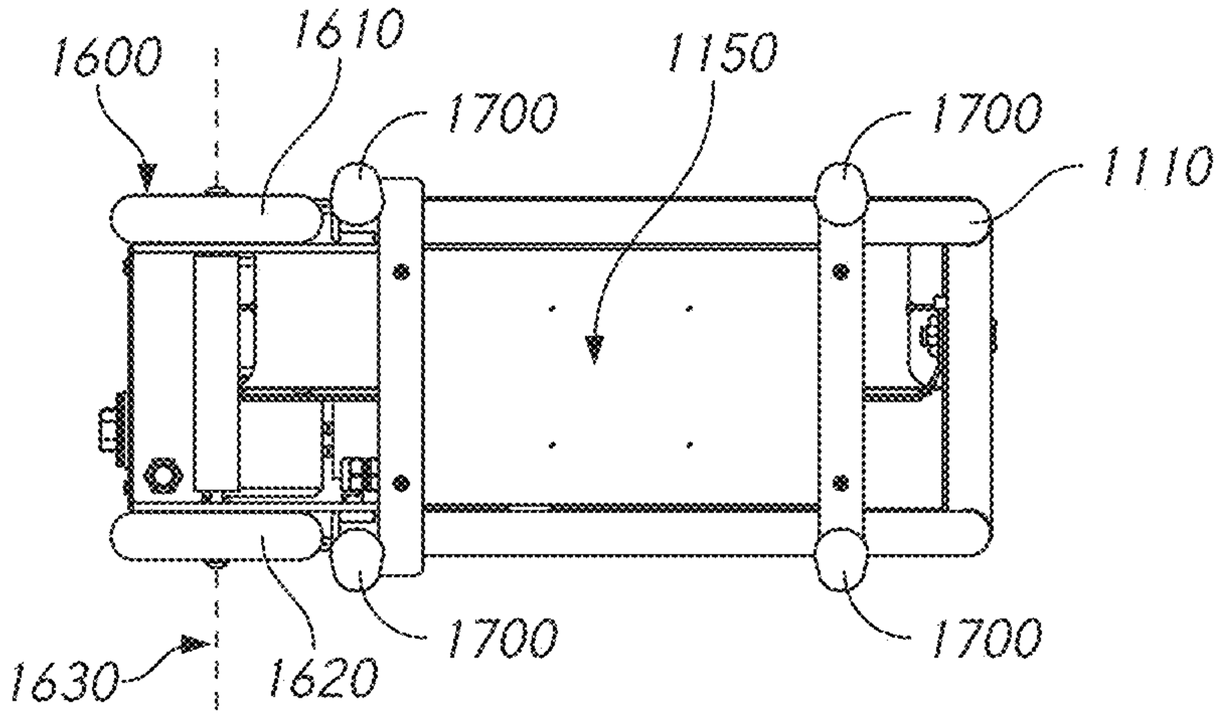

1600
1610
1700
1150
1700
1110
1630
1620
1700
1700

FIG. 5B

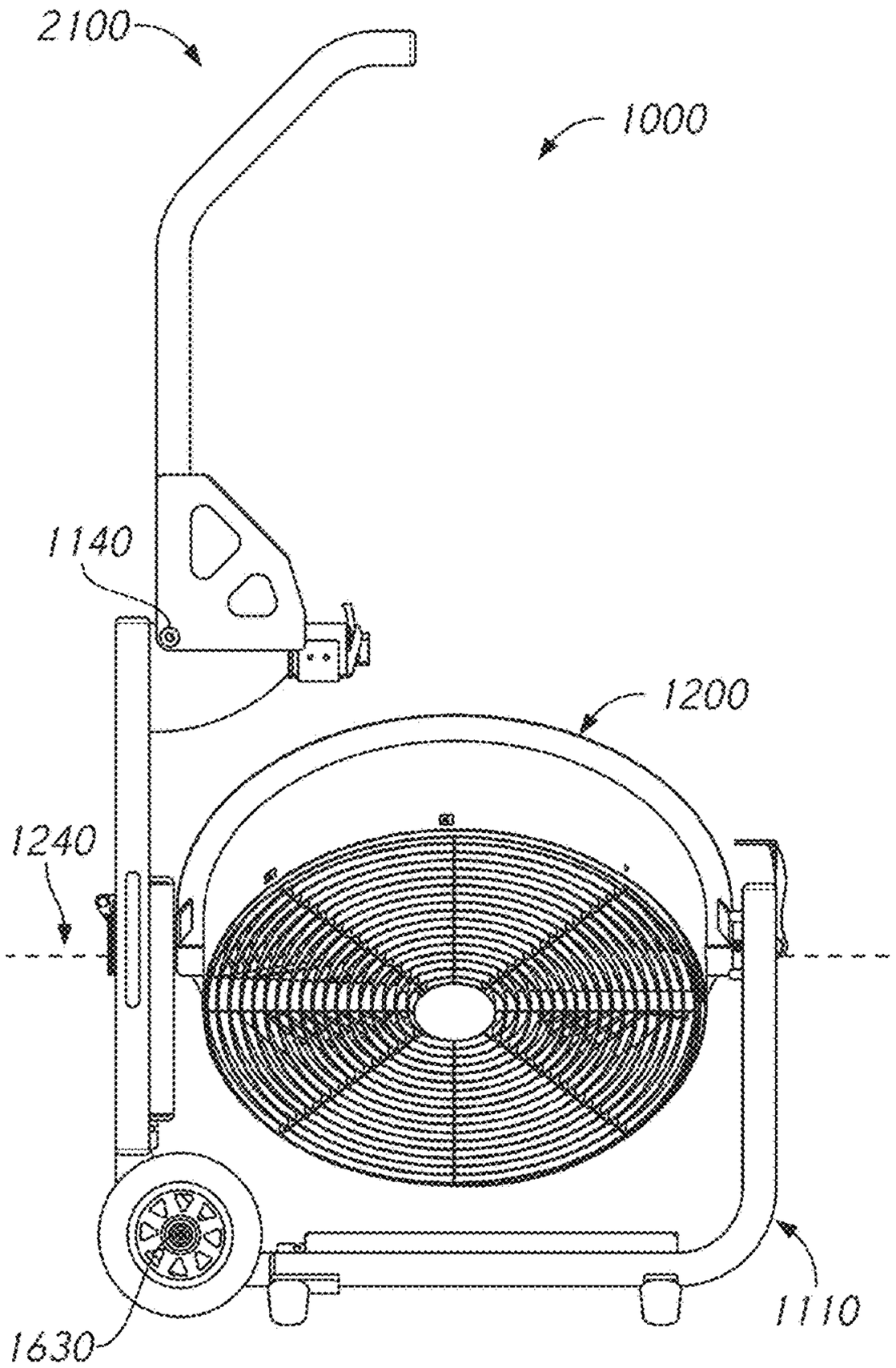


FIG. 6A

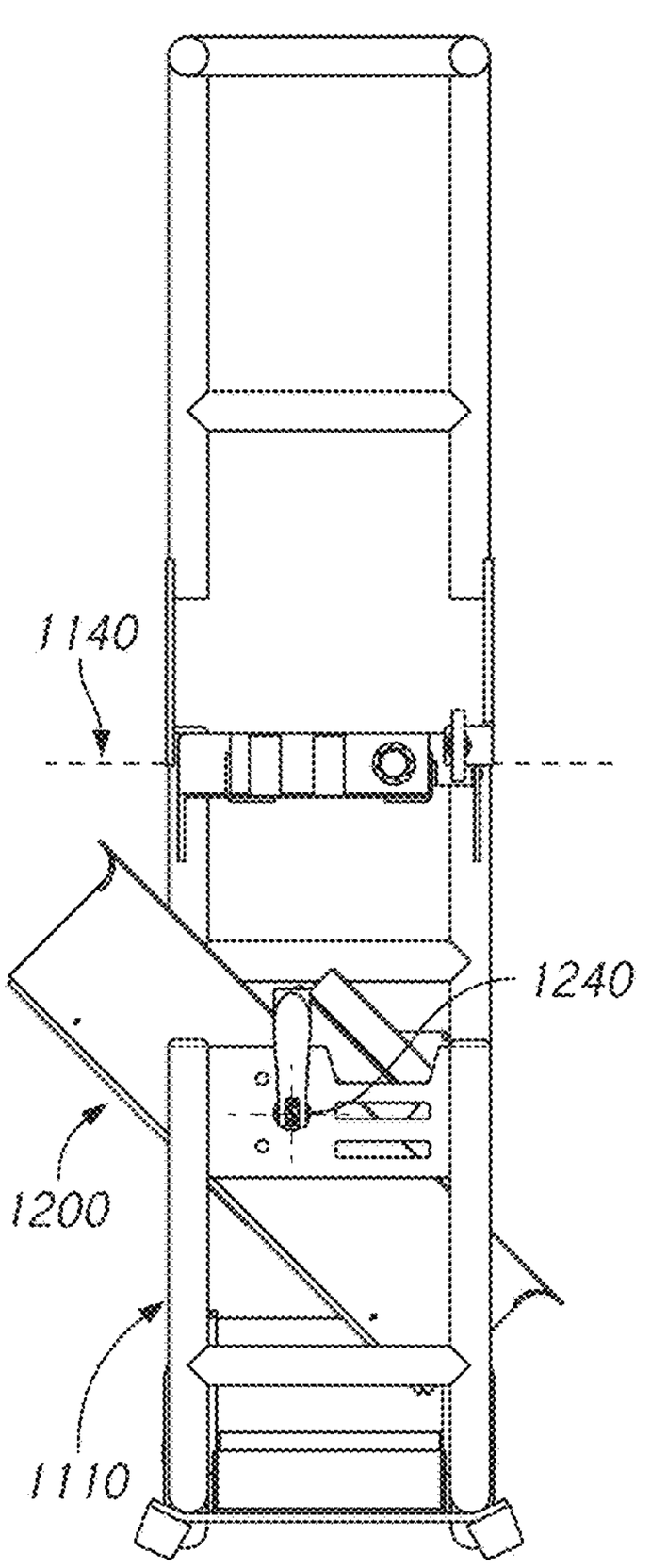


FIG. 6B

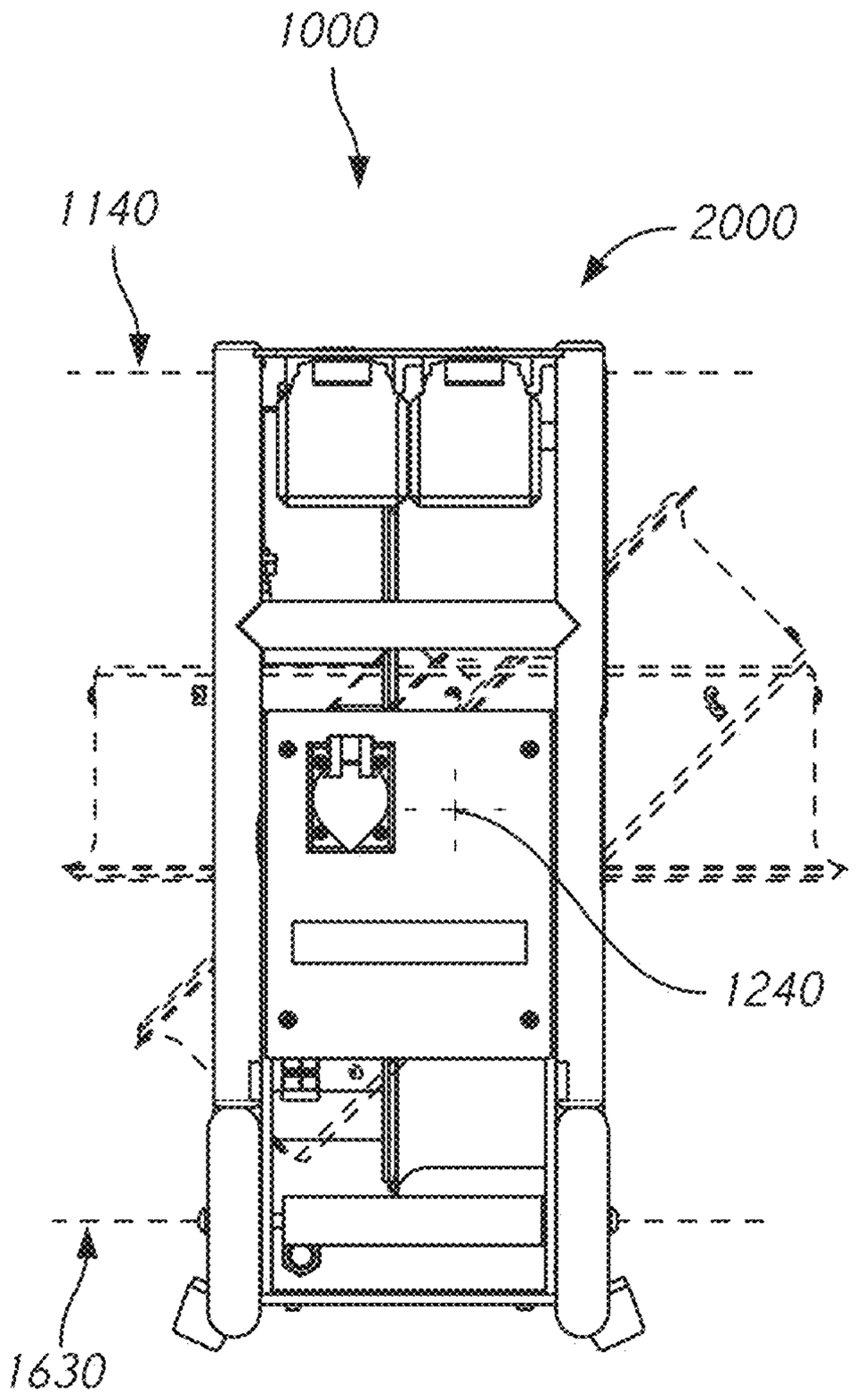


FIG. 6C

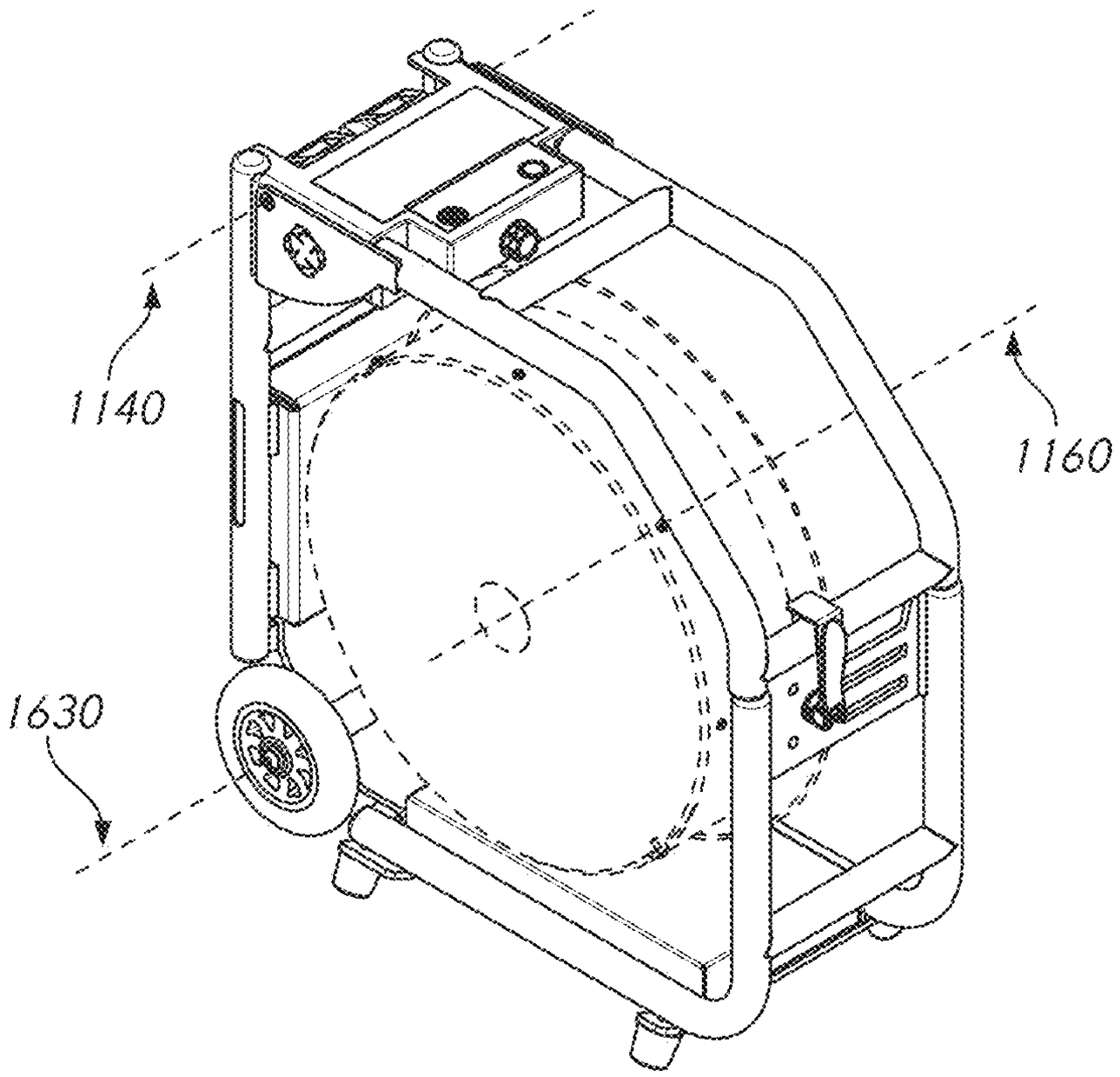


FIG. 7A

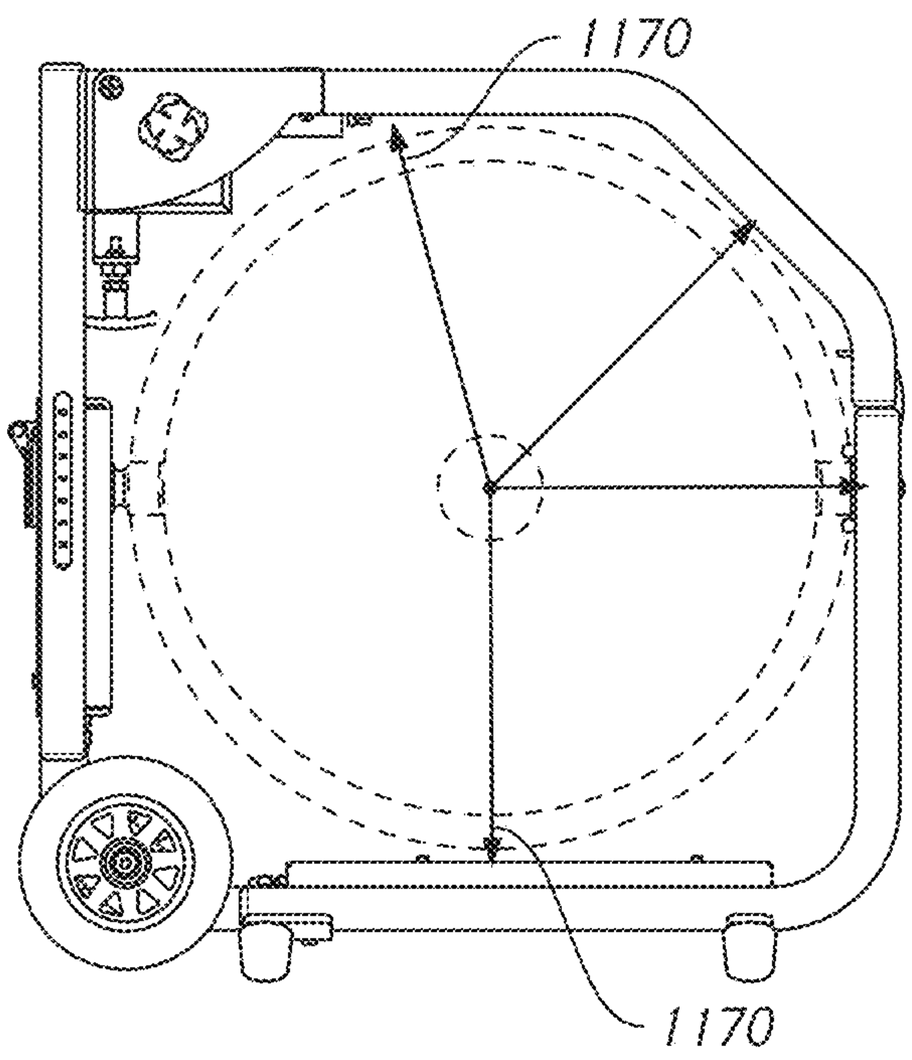


FIG. 7B

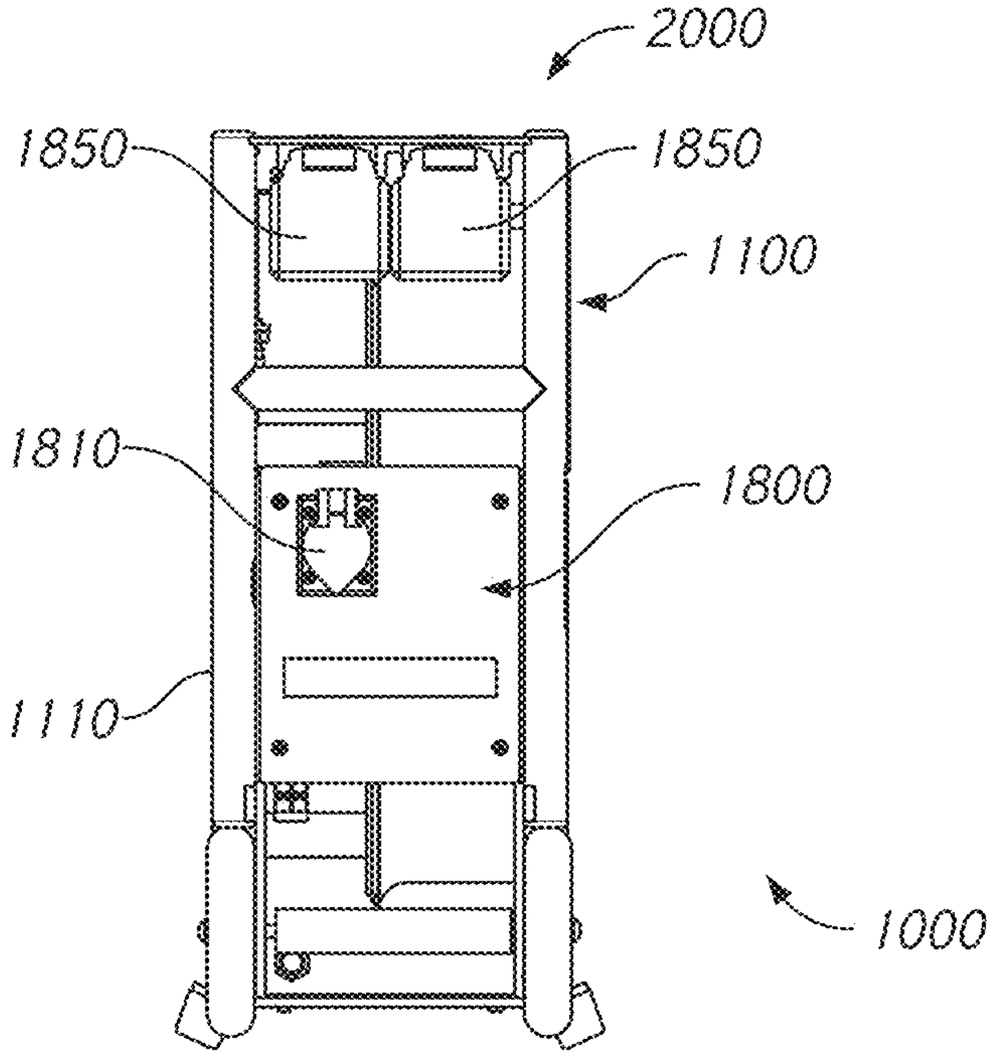


FIG. 8A

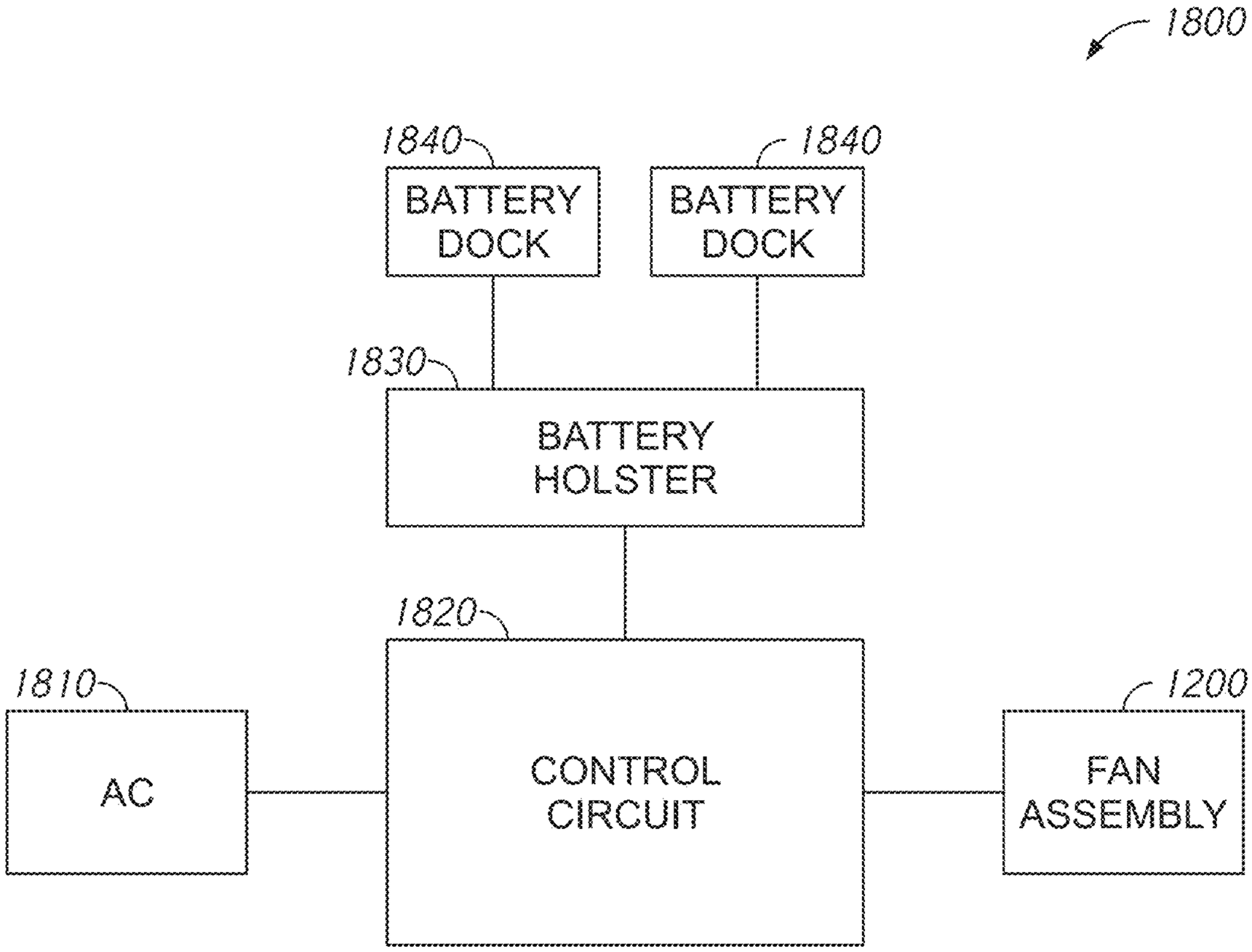
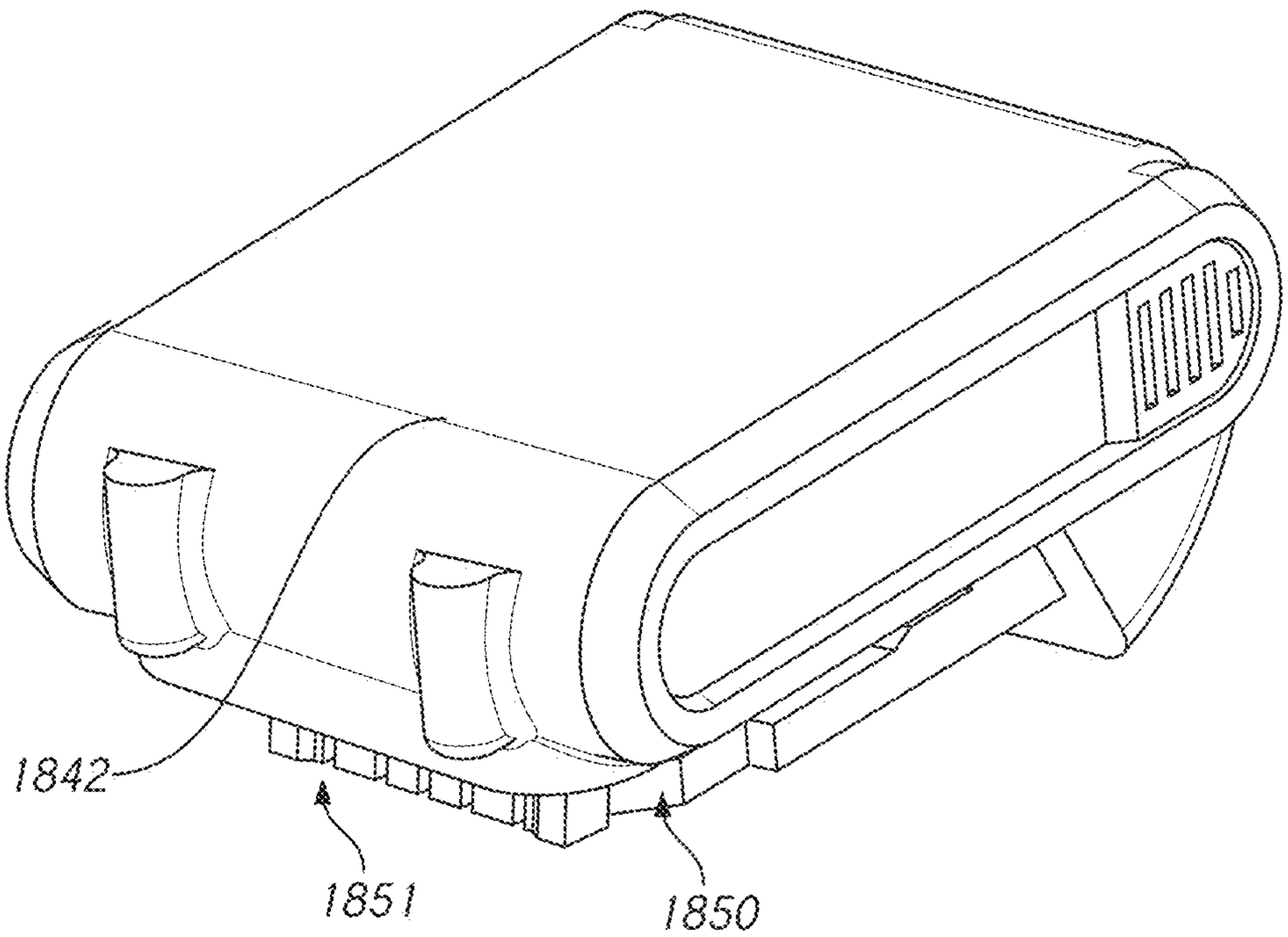

1800
1840
BATTERY DOCK
1840
BATTERY DOCK
1830
BATTERY HOLSTER
1820
1810
AC
CONTROL CIRCUIT
1200
FAN ASSEMBLY

FIG. 8B



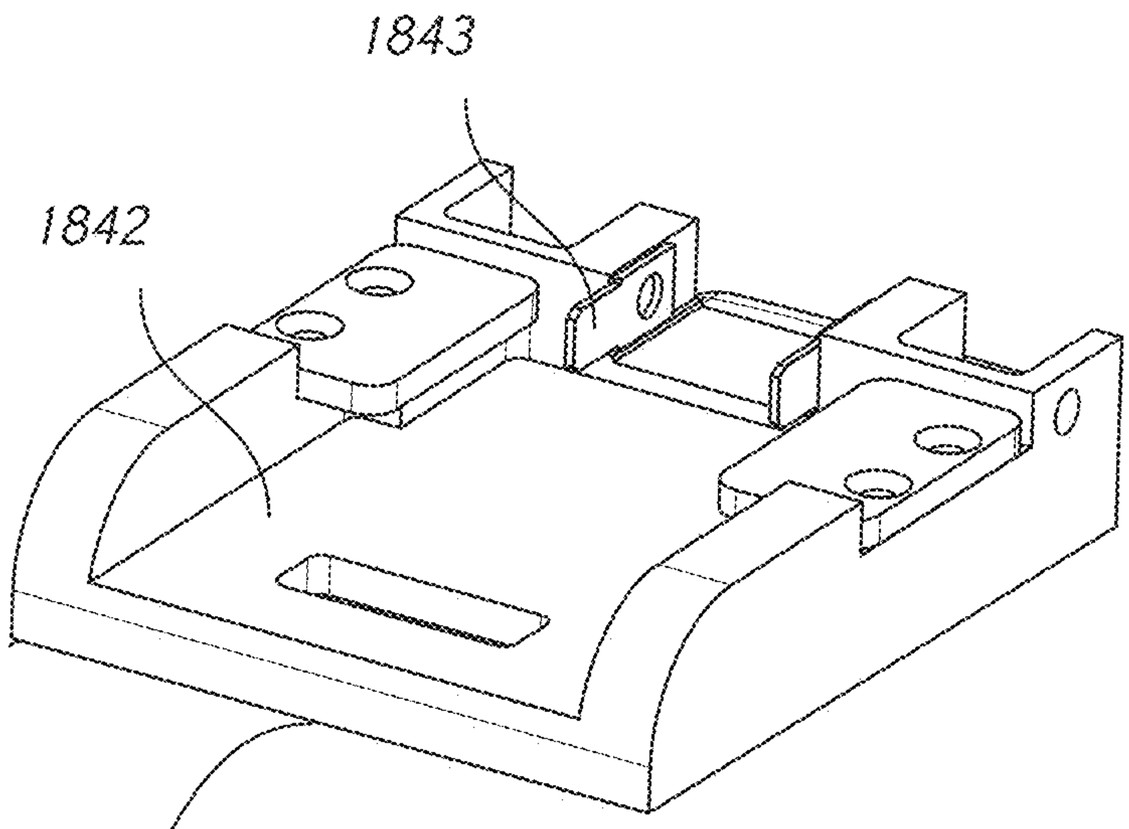


FIG. 8C

PORTABLE FAN

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. patent application Ser. No. 16/728,678 entitled "PORTABLE FAN" filed on Dec. 27, 2019, which claims the benefit of U.S. Provisional Patent Application No. 62/785,384 entitled "PORTABLE FAN" filed on Dec. 27, 2018 and U.S. Provisional Patent Application 62/842,107 entitled "PORTABLE FAN" filed on May 2, 2019, the entire contents of all of which are incorporated herein by reference in their entirety for all purposes.

FIELD OF THE INVENTION

The present invention is directed to a portable fan for the use in firefighting and other ventilation use-cases. A portable fan provides firefighters the ability to provide positive pressure ventilation in use for fighting fires, which does not require power cables or combustible fuel powered motors, to provide increased portability, reduced risk, and reduced deployment time associated with managing and fighting a fire.

BACKGROUND OF THE INVENTION

Firefighters increasingly use a method of managing fires using a method commonly referred to as Positive Pressure Ventilation (PPV) which is a ventilation technique use by fire fighters to remove smoke, heat, and other combustion products from a structure. The use of PPV allows firefighters to perform tasks in a more controlled environment resulting in a more efficient management of a fire affected structure and a reduction of risk. In practice, PPV allows fire fighters to positively pressurize a structure in which they have strategically opened vent locations elsewhere in the structure. When the structure is placed under positive pressure when performing a PPV operation, the combustion products are directed toward the vent locations, where they exit the vent locations and are exhausted away from the structure. In certain scenarios, firefighters may pressurize a structure without vent locations to force combustion products to flow to a "protected" area wherein the combustion products are isolated away from individuals trapped within the structure. The PPV process is commonly accepted and found to be effective by the National Institute of Safety and of Standards and Technology. (Kerber, Stephen, et al. Go With the Flow: NIST Study Proves PPV Can Save Lives & Improve Safety. Tech Focus, FireRescue Magazine, November 2009 [online], [retrieved on De. 11, 2019]. Retrieved from Internet URL:https://tsapps.nist.gov/publication/get_pdfcfm?pubid=904210).

The act of fighting fires is inherently dangerous where the difference of seconds in performing certain operations can mean the difference between life and death. Smoke inhalation is the primary cause of fire-related deaths. Seconds can be saved, and actions performed with increased efficiency and reliability—results in an increase of victim rescue success and a reduction of firefighter death.

SUMMARY OF THE INVENTION

It is common practice to use fans to initiate PPV operations in order to provide more suitable and favorable conditions in a fire affected structure after the fan has been extinguished. These fans are typically electrically, or fuel powered.

A common shortfall with electrically powered fans surrounds the availability of power. This is limited by availability of power as well as the length of power cord available which limits the distance from the power source that the fan can be set up for use. Establishing power through the use of a generator or on-board power aboard a fire truck requires personnel and steps which delay the establishment of the fan for PPV use. The more quickly a PPV fan can be established, the more quickly a fire affected structure can be cleared of combustion products—, thereby reducing the risk of death from smoke inhalation.

A common shortfall with fuel powered fans surrounds the maintenance and reliability. A fuel powered fan employs a fuel powered motor to operate the fan, and the fuel powered motor requires regular maintenance and upkeep to ensure the reliability of the fan to operate when needed. Without regular maintenance, fuel powered motors may be difficult to start or stall. In both these scenarios, an increased likelihood of injury or death exists to both fire victims and firefighting personnel as this delays the clearing of smoke from the structure. Furthermore, combustion hazards exist with the use of a fuel powered fan near a fire affected building. Because the fuel powered fan includes a reservoir, great care must be taken to prevent the fuel source of the fan from becoming a secondary source of combustion resulting in the reignition of a structure fire which has already been extinguished. Full powered fans can also be undesirable because by-products of combustion from the fuel powered motor can add carbon monoxide and other undesirable fumes into the structure.

It is an aspect of certain embodiments of the present invention to provide a reliable and rapidly deployed portable fan which does not require the limiting tether of an electrical cord or a combustion risk associated with a fuel reservoir. Certain embodiments of the present invention operate on commonly available batteries, such as those used with cordless power tools. As fire crews commonly rely upon battery operated power tools for managing a fire affected building, it is an aspect of certain embodiments to leverage the batteries which a fire crew already uses with existing tools. This limits the need for the purchase and charging of alternate batteries and increases the ease of readiness for establishing a portable fan.

Certain embodiments are configured to receive an existing rechargeable battery allowing as user to change the battery in the event that the battery charge has been exhausted. Certain embodiments are configured to receive multiple rechargeable batteries allowing a user to replace a first battery while a second battery remains attached to the portable fan to continue powering the fan in the event of a battery change.

Certain embodiments of the present invention includes a battery dock and battery holster. The battery holster being interconnected to the frame, has electrical connection to the portable fan. The battery dock is configured to mate with the battery holster and with a battery simultaneously such that the interconnection of the battery, battery dock, and battery holster provides electrical power from the battery to the portable fan. The battery dock being interchangeable and configurable to mate with any existing battery mounting design allows a user to leverage any existing rechargeable battery. It will be appreciated that a user may use rechargeable tool batteries manufactured by Dewalt®, Milwaukee®, Ridgid®, Ryobi®, or Makita®. It will be further appreciated

that the use of batteries manufactured by entities not disclosed are within the scope and spirit of the present invention.

Some PPV fan motors require a higher voltage than existing tool batteries are able to supply. It is an aspect of the present invention to allow the alternative use of multiple batteries in series or parallel, and allow the draw of power from a single battery at a time or multiple batteries at once to provide the power needed to operate the portable fan as disclosed herein.

Certain embodiments comprise a portable fan having a power assembly adapted to monitor the power available in multiple rechargeable batteries and to draw power alternatively from the individual batteries for periods time based upon time, voltage, and/or current so that the power in each of the multiple batteries drains at a relatively constant rate with no noticeable change to the end user. The electronic circuitry of the power assembly may also be adapted to manage the use of power from multiple rechargeable batteries for powering the fan motor and other electronic functions of the portable fan.

In certain embodiments, a power assembly the power assembly is adapted to monitor the power available in multiple rechargeable batteries and to draw power from the individual batteries in order to equalize the power available in each battery. In one example of this embodiment, when the end user inserts multiple rechargeable batteries having different power levels into the battery dock, the power assembly will determine the power available in each battery and draw power first from the battery (or batteries) having more available power until the power available in all of the multiple batteries is relatively the same. Once the available power in all of the multiple batteries is relatively the same, the power assembly will draw power alternatively from the individual batteries for periods of time based on time, voltage, and/or current so that the power in each of the multiple batteries drains at a relatively constant rate.

In certain embodiments, a power assembly is configured to balance the power available between multiple rechargeable batteries while the portable fan is not in use.

In certain embodiments, a power assembly comprises circuitry for controlling the supply of electricity to the fan motor, for monitoring and displaying power available in the rechargeable batteries, for controlling recharging of the batteries from an A/C power source, for controlling the fan speed, and for sensing an external A/C power source and switching off the power supply from the batteries when A/C power is detected. Furthermore, the electronic circuitry of the power assembly may be adapted to regulate charging current or voltage using semiconductor devices or other electrical circuits only, or regulated in response to non-electric parameters such as battery temperature only or in combination with semiconductor devices or other electrical circuits.

Firefighters often wear protective gear and equipment that typically weighs in excess of 31.7 kg (70 lb) For this reason, extra equipment that must be carried by a firefighter is particularly burdensome and may require more than one firefighter to carry. An existing shortfall with some existing fans surrounds weight and portability. Some existing PPV fans, for instance, weigh 31.7 kg (70 lb) or more. These fans often require multiple individuals to carry thus reducing the availability of personnel to carry out other necessary tasks. Further still, some existing PPV fans—such as U.S. Pat. No. 5,941,314 to Weinmeister, et al. issued Aug. 24, 1999, herein incorporated in its entirety for all purposes—attempt to provide a foldable handle to engage wheels thereby allowing an individual to roll the fan to a location. Where such solutions fall short surround the operability of the fan in a closed configuration. Furthermore, storage space on a fire-fighting vehicle is limited, such solutions require a large volume for storage and transportation even in a closed configuration.

It is an aspect of the present invention to provide a portable fan which is lighter, more portable, and requires a smaller volume for storage and transportation when in a closed configuration than existing PPV fans.

These and other advantages will be apparent from the disclosure of the inventions contained herein. The above-described embodiments, objectives, and configurations are neither complete nor exhaustive. As will be appreciated, other embodiments of the invention are possible using, alone or in combination, one or more of the features set forth above or described in detail below. Further, this Summary is neither intended nor should it be construed as being representative of the full extent and scope of the present invention. The present invention is set forth in various levels of detail in this Summary, as well as in the attached drawings and the detailed description below, and no limitation as to the scope of the present invention is intended to either the inclusion or non-inclusion of elements, components, etc. in this Summary. Additional aspects of the present invention will become more readily apparent from the detailed description, particularly when taken together with the drawings, and the claims provided herein.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1**A—A perspective view of certain embodiments in first configuration

FIG. **1**B—A front view of certain embodiments in first configuration

FIG. **2**A—A front view of certain embodiments in second configuration

FIG. **2**B—A side view of certain embodiments in second configuration

FIG. **3**A—A front view of certain embodiments

FIG. **3**B—A top view of certain embodiments

FIG. **4**A—A front view of certain embodiments showing a first configuration and second configuration

FIG. **4**B—A front view of certain embodiments showing a first configuration and second configuration

FIG. **5**A—A perspective view of certain embodiments

FIG. **5**B—A bottom view of certain embodiments

FIG. **6**A—A front view of certain embodiments in second configuration with a fan assembly directed in a downward direction

FIG. **6**B—A side view of certain embodiments in second configuration with a fan assembly directed in a downward direction

FIG. **6**C—A side view of certain embodiments in second configuration showing potential fan assembly positions

FIG. **7**A—A perspective view of certain embodiments

FIG. **7**B—A front view of certain embodiments

FIG. **8**A—A side view of certain embodiments

FIG. **8**B—A power assembly of certain embodiments

FIG. **8**C—A battery dock and battery of certain embodiments

DETAILED DESCRIPTION OF VARIOUS EMBODIMENTS

Certain embodiments of the present invention, shown in FIG. **1**A-FIG. **1**B, comprise a portable fan **1000** having a

frame **1100**, fan assembly **1200** and power assembly **1300**. The frame **1100** of certain embodiments comprises a first frame portion **1110** rotatively connected by a hinge **1130** to a second frame portion **1120**. The hinge **1130**, consistent with a first axis of rotation **1140**, allows the second frame **1120** portion to rotate upwards from a first configuration **2000** as shown in FIG. **1**A-FIG. **1**B, to a second configuration **2100** shown in FIG. **2**A-FIG. **2**B. In certain embodiments, a first configuration **2000** comprises the first frame portion **1110** and the second frame portion **1120** surrounding the fan assembly. Alternatively, the second configuration **2100** comprises the second frame **1120** portion in an open configuration in relation to the first frame portion **1110**.

A fan assembly **1200**, shown in FIG. **3**A-FIG. **3**B, of certain embodiments comprises a motor **1210**, a fan blade **1220**, and a shroud **1230**. However, it will be appreciated that a fan or fan assembly surrounds a machine used to produce airflow in a desired direction. It will be further appreciated that certain fan assemblies rely on differing technology to produce airflow including axial-flow fans as shown, centrifugal fans, and bladeless indirect viscous-shear fans such as U.S. Pat. No. 8,308,445 to Peter Gammack, et al—the contents of which are incorporated herein by reference for all purposes. Thus, embodiments comprising an axial-flow fan, centrifugal fan, bladeless indirect viscous-shear fans are within the spirit and scope of the present invention.

In certain embodiments, shown in FIG. **4**A-FIG. **4**B, the first configuration **2000** comprises the second frame portion **1120** and the first frame portion **1110** in a substantially contiguous border around the fan assembly **1200**. Alternatively, in a second configuration **2100**, the second frame portion **1120** of the frame is rotated upward and away from the fan assembly **1200** about the first axis of rotation **1140**, thereby configuring the second frame portion **1120** to be used for transporting the portable fan **1000**, similarly to a hand truck. In the second configuration **2100** a user is able to use a distal end **1122** of the second frame portion to rotate the portable fan **1000** to engage a roller assembly **1600**, thereby permitting the user to pull or push the portable fan **1000** to a desired location without the need to lift the portable fan **1000** from the ground.

In certain embodiments, referencing FIG. **4**A, to allow the rotation of the second frame portion **1120** in relation to the first frame portion **1110**, a user must actuate a hinge lock **1500**. The hinge lock **1500** maintains the position of the second frame portion **1120** in relation to the first frame portion **1110** when not actuated. It will be appreciated that a hinge lock **1500** is not limited to locking the frame **1100** in a first configuration **2000** and second configuration **2100** as shown. In certain embodiments, a frame release **1550** (shown in FIG. **1**A) located between the distal end **1112** of the first frame portion and a distal end **1122** of the second frame portion must be actuated to allow the rotation of the second frame portion **1120** from the first frame portion **1110** in transitioning from a first configuration **2000** to a second configuration **2100**. In certain embodiments, frame release **1550** maintains the position of the second frame portion **1120** in relation to the first frame portion **1110** when not actuated.

In certain embodiments of a portable fan **1000**, shown in FIG. **5**A-FIG. **5**B, a wheel assembly **1600** comprises a first wheel **1610** and a second wheel **1620** rotatably interconnected to the first frame portion **1110** wherein the first wheel **1610** and the second wheel **1620** rotate about a second axis of rotation **1630**. In certain embodiments the second axis **1630** of rotation is parallel with the first axis of rotation **1140**.

In certain embodiments, shown in FIG. **5**B, a portable fan **1000** further comprises feet interconnected to a bottom aspect **1150** of the first frame portion **1110** configured to engage with the ground. The feet **1700** contact the ground, prior to a user engaging a wheel assembly **1600** with the ground, such that the feet **1700** provide a static base for the portable fan **1000** when not in transport by a user. Although embodiments are shown disclosing four feet **1700**, it will be appreciated that embodiments having a singular foot, less than four feet, or more than four feet are within the spirit and scope of the present invention. Furthermore, it will be appreciated that embodiments having feet **1700** configured to engage with the ground connected to a bottom aspect **1150** of the first frame portion fan while the wheel assembly **1600** is engaged with the ground is within the spirit and scope of the present invention.

In certain embodiments, shown in FIG. **6**A-FIG. **6**C, the fan assembly **1200** is rotatably interconnected to the first frame portion **1110**, wherein the fan assembly **1200** is rotatable about a third axis **1240**. In certain embodiments, the third axis **1240** is substantially orthogonal to the first axis **1140** and the second axis **1630**. The fan assembly **1200** is rotatably adjustable while the portable fan **1000** is in a first configuration **2000** or a second configuration **2100**. Thus, the fan assembly **1200** is rotatably adjustable to allow configuration wherein the fan can be configured to provide positive pressure ventilation in a forward attack, a positive tilt attack (upward angle), negative tilt attack (downward angle), vertically upwards such as necessary for an attic attack or vertically downward such as necessary for a manhole attack. Certain embodiments allow rotatable adjustability within the frame **1100** without restriction regardless of if the portable fan **1000** is in a first configuration **2000** or second configuration **2100**. Thus, a fan assembly **1200** has an equal range of rotatable adjustability in a first configuration **2000** as in a second configuration **2100**. Certain embodiments comprise a range of rotatable adjustability of 90 degrees upward, and 90 degrees downward for a total of 180 degrees range of rotatable adjustability. It will be appreciated that certain embodiments may have up to 360 degrees of rotatable adjustability, or continuous adjustability while keeping within the spirit and scope of the present invention.

In certain embodiments, the frame **1100** surrounds the fan assembly **1200**. The frame **1100** comprises radial offsets **1170** from a fourth axis **1160** which is parallel to the first axis **1140** and the second axis **1630** as shown in FIG. **7**A-FIG. **7**B. It may be desired, but is not required that the fourth axis **1160** is coincident with a central aspect of the fan assembly **1200**. Furthermore, the radial offsets **1170** need not be equivalent in each radial direction from the fourth axis **1160** in order to be in keeping with the spirit and scope of the present invention. It will be appreciated that although a generally rectangular frame **1100** is shown, a frame **1100** having alternative shapes such as round or oblong are in keeping with the spirit and scope of the present invention. It will be further appreciated that a frame can have a shape configured to surround a single fan assembly or multiple fan assemblies as desired while in keeping with the spirit and scope of the present invention.

Certain embodiments, shown in FIG. **8**A-FIG. **8**C, comprise a power assembly **1800** connected to the first fame portion **1110** wherein the power assembly **1800** comprises an AC interface **1810**, a control circuit **1820** for controlling

the power provided to the motor of the fan assembly **1200**. In certain embodiments a power assembly **1800** further comprises a battery holster **1830** electrically connected to the power assembly **1800**. The battery holster **1830** is configured to slidably receive a battery dock **1840** wherein a first side **1841** of the battery dock is configured to interconnect with the battery holster **1830** and the second side **1842** of the battery dock is configured to interconnect with a rechargeable battery **1850** wherein the contacts **1843** of the battery dock interface with the contacts **1851** of the battery. The battery holster **1830** of certain embodiments is configured to be within the envelope of the frame **1100** particularly when the frame **1100** is in a first configuration **2000**.

Certain embodiments comprise a battery holster **1830** configured to slidably receive a first battery dock **1840** and a second battery dock **1840**, thus enabling the electrical connection of a first battery **1850** and a second battery **1850** to the power assembly **1800**. In certain embodiments a control circuit **1820** is configured to receive power from the first battery **1850** and the second battery **1850** simultaneously. In certain embodiments, a first battery **1850** and a second battery **1850** have differing power capacities, and the control circuit **1820** is configured to selectively draw power from the first battery **1850** or the second battery **1850** individually, equally simultaneously, or draw differing electrical loads from the first battery **1850** and second battery **1850** simultaneously. Furthermore, the control circuit **1820** of certain embodiments is configured to receive AC power from the AC interface **1810** to alternatively power the portable fan **1000**, recharge the batteries **1850**, or simultaneously recharge the batteries **1850** and power the portable fan **1000**.

While various embodiments of the present invention have been described in detail, it is apparent that modifications and alterations of those embodiments will occur to those skilled in the art. However, it is to be expressly understood that such modifications and alterations are within the scope and spirit of the present invention. Further, the inventions described herein are capable of other embodiments and of being practiced or of being carried out in various ways. In addition, it is to be understood that the phraseology and terminology used herein is for the purposes of description and should not be regarded as limiting. The use of "including," "comprising," or "adding" and variations thereof herein are meant to encompass the items listed thereafter and equivalents thereof, as well as, additional items.

What is claimed is:

1. A portable fan comprising:

a frame comprising a first portion and a second portion;

a wheel assembly interconnected to the first portion, the wheel assembly comprising at least one wheel rotatable about a first axis of rotation; and

a fan assembly comprising a motor having a second axis of rotation and a shroud, wherein the shroud and is rotatably interconnected to the first portion about a third axis of rotation substantially orthogonal to the first axis and second axes;

wherein in a first configuration, the frame forms a substantially contiguous border around the fan assembly that is radially and laterally offset from the shroud and the at least one wheel is elevated from the ground,

wherein in a second configuration, the second portion is extended away from the first portion and is adapted to allow a user to rotate the portable fan and engage the at least one wheel with the ground, and

wherein the fan assembly is adapted to rotate about the third axis in the first configuration and the second configuration.

2. The portable fan of claim **1** further comprising:

a power assembly connected to the first portion, the power assembly comprising a battery holster, an AC power interface, and a control circuit for controlling the supply of electricity to the motor.

3. The portable fan of claim **2** further comprising:

a first battery dock configured to engage a first battery and the battery holster, wherein engaging the first battery to the first battery dock and engaging the first battery dock to the battery holster results in electrical interconnection of the first battery and the control circuit.

4. The portable fan of claim **3** further comprising:

a second battery dock configured to engage a second battery and the battery holster, wherein engaging the second battery to the second battery dock and engaging the second battery dock to the battery holster results in electrical interconnection of the second battery and the control circuit.

5. The portable fan of claim **4**, wherein the control circuit is configured to receive power from the first battery or the second battery.

6. The portable fan of claim **5**, wherein the control circuit is configured to selectively draw power from the first battery and the second battery individually.

7. The portable fan of claim **2**, wherein the control circuit is configured to receive power from batteries comprising different power capacities.

8. The portable fan of claim **2**, wherein the control circuit is configured to recharge the batteries from AC power received through the AC power interface.

9. The portable fan of claim **1**, wherein the wheel assembly of the portable fan is offset from the ground, and wherein the at least one wheel engages the ground when the portable fan is rotated toward the wheel assembly.

10. A portable fan comprising:

a frame comprising a first portion and a second portion;

a hinge interconnecting the first portion and the second portion;

at least one of a frame release or a hinge lock;

a wheel assembly interconnected to the first frame portion, the wheel assembly comprising at least one wheel having a first axis of rotation; and

a fan assembly comprising a motor, the fan assembly rotatably interconnected to the first portion about a second axis of rotation substantially orthogonal to the first axis of rotation and having a rotational range of about 180 degrees about the second axis of rotation;

wherein at least one of the hinge lock or the frame release must be actuated in order to transition the portable fan from a first configuration to a second configuration;

wherein in the first configuration, the frame forms a substantially contiguous radial and lateral border around and offset from the fan assembly and the at least one wheel is elevated from the ground,

wherein in the second configuration, the second portion is configured to extend away from the first portion, and

wherein the at least one wheel is adapted to engage with the ground when the portable fan is rotated about an axis substantially orthogonal to the second axis of rotation.

11. The portable fan of claim **10** further comprising:

a power assembly interconnected to the first portion, the power assembly comprising a battery holster, an AC power interface, and a control circuit for controlling the supply of electricity to the motor; and

a first battery dock configured to engage a first battery and the battery holster, wherein the first battery dock is adapted to electrically interconnect the first battery to the control circuit.

12. The portable fan of claim **11** further comprising:

a second battery dock configured to engage a second battery and the battery holster, wherein the second battery dock is adapted to electrically interconnect the second battery to the control circuit.

13. The portable fan of claim **11**, wherein the control circuit is configured to receive power from a plurality of batteries.

14. The portable fan of claim **12**, wherein the control circuit is configured to selectively draw power from a first battery and a second battery individually.

15. The portable fan of claim **11**, wherein the control circuit is configured to receive power from batteries comprising different power capacities.

16. The portable fan of claim **11**, wherein the control circuit is configured to recharge batteries from AC power received through the AC power interface.

17. The portable fan of claim **10**, wherein the wheel assembly is offset from the ground, and wherein the at least one wheel engages the ground when the portable fan is rotated toward the wheel assembly.

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